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The Correlation of E-learners' Socio-Demographic Characteristics and E-Learning Profile on the Academic Performance of PUP Laboratory High School Students in Mathematics

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Abstract

Due to the crisis brought about by the Coronavirus pandemic, the usage and appreciation of e-learning have expanded in the teaching and learning processes. This research aims to correlate the relationship of high school students' socio-demographic characteristics and e-learning profiles on their academic performances in mathematics. The research adheres to the constructivism theoretical framework, which assumes that traditional learning can be strengthened by freshly instilling agents (e-learning). E-learning will help build new information on top of existing knowledge and initiate and facilitate learning toward independent learning. The study developed is descriptive-correlational. Descriptive correlational studies describe the variables and the relationships that occur naturally between and among them. Pearson Correlation was applied using the Statistical Package for Social Sciences (SPSS) software to measure the relationship of the demographic profile and e-learning characteristics of the student-respondents to their academic performances. A researcher-made questionnaire was used to elicit student respondents' information on their socio-demographic characteristics and e-learning profile as the independent variables. The results show a significant relationship between the e-learning profile of the students towards their academic performances. However, their socio-demographic characteristics have nothing to do with their academic performances. Furthermore, duties at home, number of family members, monthly income of the respondents do not affect their performances in school. Therefore, the e-learning profile of the respondents must be strengthened to improve their academic performances.

Keywords: e-learning profile, e-learning, academic performance, socio-demographic characteristic, students

Introduction

Currently, the e-learning method, due to the period of confinement that is occurring because of the COVID-19 pandemic, has increased its use and application in the teaching and learning process (Moreno-Guerrero, 2020). Emergence of Open and Distance Learning (ODL) in Nigeria seems to have strengthened the awareness, appreciation and application of Information and Communication Technology (ICT) among its users (Israel, 2015). The instruction in Digital Learning Management (DLM) environments can be designed to help students identify useful information, understand how materials fit together and see how materials relate to prior knowledge (Mayer, 2001). Following in line with growth in higher education over the past decade, there has been growth in online learning across all of academia. In one year, enrollment in face-to-face courses increased 2% while enrollment in online increased 10% (Allen, 2007). With their open-door admission policy, community colleges serve a population with diverse needs and a wide range of skills. To prepare this diverse population for college-level courses, community colleges offer non-credit developmental courses math, reading, and writing. Seventy nine percent (79%) of students entering community

colleges will need these developmental courses (Jenkins & Boswell, 2002). While the number of students needing developmental coursework continues to grow, research on this population and their success rate, is very limited (Barnett, 2008). Furthermore, public colleges continue to create online courses and enroll students in these courses who may or may not be technically and educationally experienced enough to prosper. Growing community college enrollment, particularly in online and developmental courses, attracts the need for research with this population.

In the educational field, technological advancement is mirrored in the development of information and communication technologies (ICT). ICTs directly impact the development of teaching and learning practices, since they foster new pedagogical measures, as well as create new learning rooms. These pedagogical actions heighten the conversion of the classroom as we see it, since they permit for the exclusion of spatial-temporal hurdles because a lot of systems can be discovered through this, as well as entry to a large amount of information, with different formats. It has also promoted the upgrade of students' motivation, autonomy, participation, and mindset for educational subject. Among the pedagogical actions based on ICTs is e-learning. There are two types of resources needed to develop the e-learning method: digital and technological. Including the digital resources are educational videos, teaching platforms, videoconferences, social networks, among many others. While technological resources can be the desktop computer, tablet, smartphone, among others. The use of the e-learning by the members engaged in the teaching and learning process becomes a question, because a regular level of digital skill is required to apply it with warranties. Thus, teachers and students are required to undergo training in the use of the numerous technological and digital resources. This teaching technique has a lot of features that make it unique from other teaching methods. Some researchers look at it as a progression of distance education. For others, it is a new teaching mode that differs significantly from face-to-face teaching. It should also be noted that the e-learning method is a special case of distance learning. There are quite a few reasons for this. In distance learning, email is used to collect the subjects of the subject, not having a computer-generated medium. Moreover, numerous theoretical contents are introduced, which are not collaborative and whose sequencing is sealed. In addition, contact with the teacher is random, which acts as a plain source of content. In this case, the student is a passive receiver, who usually has a sense of isolation. In other words, e-learning lets the students to be competent while they are on the transfer or in a place other that their typical one, encouraging a transformation in the teacher-learner outlook, and with it the viewpoint of learning, in which the student arranges his training process and the teacher directs that action, and allowing boundless admission to the network resources. Thus, the use of e-learning does not have the anticipated result on educational learning.

Mathematics in the field of social sciences is considered a necessary instrument to be able to decipher the closest environment and represent various facts, be they social, scientific, and technical that occur in today's world (Moreno-Guererro, 2020). In his study, he presented a teaching method based on e-learning for adult students who study in high school in the distance mode. The objective of this paper is to give steadiness to the claim of the e-learning method in the teaching of Mathematics, with the purpose of opposing the results obtained in other studies with similar features. Mathematics anxiety and negative attitudes towards mathematics can have a negative impact on student success in university-level mathematics courses. Nunez-Pena and Suarez-Pellicioni (2013) discerned students who neglected a mathematically difficult university course had higher mathematics anxiety and higher course anxiety that students who passed the university course. In addition, they observed students who failed the course had lower self-confidence in and motivation for mathematics than students who passed. While such attitudinal and emotional factors can influence student commit-

ment and diligence in mathematics (Furner and Gonzales-DeHass, 2011). On the other hand, mathematics simplifies the insight of different trends, whether its social reality itself, commercial aspects, or past facts, among others. In this case mathematics develops an ample instrument to obtain knowledge, replicate on social aspects, and embody data from the world. Mathematics tries to convert all these facts into knowledge and information. Moreover, the language used in the mathematical field allows the events that arise to be described in detail and correctly.

Mathematical subjects have been challenging to learn because of their inherent attributes, such as concept, prerequisites, and technicalities, amongst others, which often leads to an absence of motivation. As cited by (Chicharro, 2019), this stimulus can be improved by increasing the efficiency of the mathematical learning in the first levels of early childhood.

D'Ambrosio and Borba (2010) consider trends of development, such as the use of digital technology in mathematics education, as a response to problems within the region of inquiry in mathematics education. The constant concern in books, journals, and in conferences in having various working groups and survey teams to plot the research in this area, indicates that this movement is still rising. But to what problem does this sub-area of investigation return. It looks that all stages of struggles to launch digital technology have encountered problems linked to shifting fixed rules of time and space that we were not conscious of when we underwent the "paper-and-pencil" classroom. In his paper, he focused on recent advances in research on digital technology. As Schrage (2001) has pointed out, the digital transmission technology has generated a "correlation transformation." If seen these ways, we will realize that ideas such as the ones of humans-with-media emphasize that if media are changed, learning may alter. Moreover, as humans develop and build new media, these media seem to convert and construct a new human.

In the study conducted by Adam, et al (2017), research on self-regulation of mathematics learning has been mainly undertaken within theoretical perspectives which are Zimmerman's model based on social-cognitive theory and theories of problem-solving. As been discuss before Zimmerman's model consists of three phases in the cyclical processes. Then the theory of problem-solving is less elaborated than Zimmerman's model as the concern of self-regulation components. It is focused on cognitive and metacognitive strategies that accompany an expert problem-solving process, namely orientation toward the task, planning a solution process or approach to the task, monitoring during task execution, evaluating the outcome, and reflecting on a solution or learning process..

In mathematics education, problem-solving has been a central focus. Mathematical problem solving been characterized as an activity that involves learners' engagement in cognitive strategies including accessing and using previous knowledge and experience. As the alternative to face-to-face learning, learners can learn mathematics subject using online learning. Learners can learn mathematics via online learning because they can get many resources on the web on this subject. This will help them to improve their skills and understanding about all topics within the subject.

In the studies conducted by Noor (2017), online learners normally can practice their skills or checks their knowledge. Thus, the finding of the meta-analysis is that classes with online learning on standard bring stronger learner learning results than do classes with exclusively face-to-face instruction. In learners presentation and attainment, mathematics through online learning are suitable, based on metacognitive tactics that enable the learners to plan and apportion learning resources, display their own information levels at different points during learning achievement, as well as motivation-emotions parameter refers to learners' thoughts, actions, and behaviors when learning that affect their efforts, determination, and emotions when performing academic tasks. These components are capable of increasing the learner's potential and performance level, moreover, learners are bor-

dered with digital gadgets in their daily life, and they do not need to spend extra attempt to get used to them because technology is believed to be a natural part of the environment.

Blended learning, which associates both online and face-to-face classroom encounters, is becoming ordinary routine in education at all levels (Lafee, 2013). The online experience can present students chances to reassess and reach theories and concepts they have previously faced in the face-to-face classroom. It can also be used to "flif" the classroom experience by giving students opportunities to meet, explore, and consider on ideas and concepts before they connect with them in the face-to-face classroom. Studies demonstrate that the online factor of blended learning improves student agency, reduces distractions that are typical in classrooms or lecture halls, increases time-on-task, and improves student performance (Allen and Seaman, 2010).

In the study conducted by Moreno-Guererro (2020), The e-learning teaching method ends with the classic labels of teaching and learning processes, since it restricts the spaces and time of training, allowing the development of the instructional act in any place and at any time. The impact of e-learning in the field of mathematics has been evaluated, in contrast to the usual expository method, in adult students who are studying for high school. There are significant differences between the values attained in the control group and the experimental group. These differences have always been in preference of the e-learning method. It can be assumed that there is an upturn in students' academic performance. Likewise, it should be considered that the e-learning method will support the autonomy of the student, adjusting to his or her learning style, which implies more individualized devotion to the teaching and learning process. What is clear in this research is that the e-learning method is related with a clearly defined pedagogical method.

In the study of Israel (2015), the results show that there is significant difference in the performance of the Open and Distance Learning students visible to Advanced Intranet-Internet Pedagogical Package (AIIPP) and the conventional group, in favor of the students trained with AIIPP. AIIP is deemed as technology. It is vital in teaching and learning mathematics specifically in an environment where teacher and learner cannot afford to face-to-face interaction. The study is in line with the findings of Jacobson et. Al (2000) that the utilization of advance design in mathematics teaching improves academic performance of students in mathematics and sciences. The finding is in conformity with the experiment carried out by Owolabi and Oginni (2014) that the animated cartoons that were used to synchronize lesson performance to the experimental group in science generated greater academic performance in the post-test. However, Amoo (2010) confirm the previous findings that the professionals that are ICT compliance and mathematically trained are to be allowed to teach mathematics at any level and those who are yet to have pedagogical knowledge of the subject matter be persuaded to do so.

The study tells that environment of the learners in Online and Distance Leaning is not a determining component for better performance of students in mathematics. This is in line with Amoo (2010) who found that the ways to accomplishing quality in mathematics education is not to challenge the effect of ICT in our school system.

In the studies cited above, the concentration was more on adult learners. Moreover, we can conclude that it is essential to make a continuous reflection on the learning process of students and continually question whether the methodology we apply is the most suitable or not. Thus, this study aims to investigate the correlation of the e-learners' socio-demographic characteristics and e-learning profile on the academic performance of PUP Laboratory High School Students in Mathematics.

Theoretical Framework

The current learning theory trend is focused on constructive learning, in which students generate new knowledge based on their prior knowledge and experiences while considering the surrounding environmental factors in the learning scenarios at hand. Students in this line actively participate in their learning activities, building their own new knowledge piece by piece.

Constructivists think that knowledge is produced within oneself, as opposed to objectivism theory of learning, which thinks that knowledge is an autonomous, unchangeable entity that is passively communicated from the teacher to the learner. Self-regulated active learning is emphasized. Mathematics, by its very nature, is drawn to self-regulated active learning through ongoing activities that progress in a spiral pattern starting from the ground up. Constructivists disagree with objectivists who believe that teachers know what is important to their students. Adamiak (2017) agrees with constructivists that knowledge is produced and socially negotiated by learners themselves, depending on prior knowledge. Students should rely on what they see, interpret, and tend to do, according to Biggs (1999). As a result, e-learning provides opportunity to support such learning interactions. This backs up Perkin's (1991) theory that a constructive learning environment can be improved by encouraging students to engage in more task-oriented activities, such as those seen in electronic aided learning.

As a result, this study adheres to the constructivism theoretical framework, which assumes that traditional learning can be strengthened by freshly infusing agents (e-learning). It is assumed that it will help to build new information on top of existing knowledge, as well as initiate and facilitate learning toward independent learning. This is aimed at raising student performance to a higher level. In exchange, electronic integration is expected to usher in a new learning trend in which the teacher's position is transformed into that of a coach, and students are actively participating in self-regulated learning, developing their own new knowledge internally.

Statement of the Problem

Specifically, the following questions were tackled in investigating the correlation of the e-learners' socio-demographic characteristics and e-learning profile on the academic performance of PUP Laboratory High School students in Mathematics.

1. What are the socio demographic characteristics of the E-learners in terms of:
   a. Grade level of the e-learners
   b. Tasks/duties and responsibilities at home
   c. Number of family members
   d. Family income
   e. Occupation of parents/guardians
2. What are the E-learning characteristics of the PUP Laboratory High School students in terms of:
   a. Type of internet connectivity
   b. Availability of learning/study area
   c. Attendance to synchronous learning sessions
   d. Availability of learning mentor/tutor
   e. Number of hours devoted for individual study
   f. Availability of learning materials at home (available textbooks)
   g. Difficulties encountered in Math learning
3. What is the academic performance of the e-learners in Mathematics?

4. Is there a significant relationship between the socio demographic profile of the e-learners and their academic performance?

5. Is there a significant relationship between the e-learning characteristics of the students and their academic performance?

Methodology

This study is descriptive-correlational. Descriptive correlational studies describe the variables and the relationships that occur naturally between and among them. This study will use a researcher's made survey questionnaire to elicit student-respondents' on their socio-demographic characteristics and e-Learning profile as the independent variables. A letter of parental consent will be sent to the parents or guardians of the respondents since the respondents are considered minors. Prior to the conduct of the survey, an orientation will be administered to the respondents on how they will answer the survey questionnaire. The survey questionnaire will be delivered online via google forms to grade 8 and 10 students, during their Homeroom classes (students have the same class schedule of homeroom). Respondents will be met by their respective class advisers in the MS Teams, and the link of the google form (which includes the survey questionnaire) will be sent. While the students are answering the survey questionnaire, they can ask questions as regards to the questionnaire to their corresponding class advisers. Series of revision has been made on the questionnaire to observe its reliability and validity. Moreover, average of the student-respondents' grade of the first three quarters in Mathematics for the School Year 2020 – 21 will be requested from the PUP Laboratory High School Office of the Registrar as the dependent variable in this research. This study is limited to the population of grade 8 and 10 students at the PUP Laboratory High School since the two grade levels have the same Mathematics teacher so the students may be given the same teaching methodology. Pearson Correlation will be applied using the Statistical Package for Social Sciences (SPSS) Software to measure the relationship of the socio-demographic characteristics and e-learning profile of the student-respondents to the respondents' academic performance. The mean and frequency percentage will be calculated to describe the socio demographic characteristics and e-learning profile of the student-respondents.

Results

Table 1: Socio-Demographic Characteristics of E-Learners

Grade Level	**Frequency**	**Percentage**
Grade 8	96	43.64 %
Grade 10	124	56.36 %
Total	**220**	**100 %**
Number of Family Members		
2	4	1.82 %
3	23	10.46%
4	66	30.00%
5	80	36.36%
6	24	10.91%
7	16	7.27%
8 and above	7	3.18 %
Total	**220**	**100 %**

Tasks/Duties and Responsibilities at Home		
Wash the Dishes	180	81.82 %
House Cleaning	145	65.91 %
Wash Clothes	63	28.64 %
Cooking	92	41.82 %
Taking Care of Younger Sibling/s	20	9.09 %
Others	10	4.55%
Family Monthly Income		
Below P 10 000	20	9.09%
P 10,001 – P 20,000	62	28.18%
P 20,001 – P 30,000	49	22.27%
P 30,001 – P 40,000	26	11.82%
Above P 40,000	63	28.64%
Total	**220**	**100%**
Occupation of Parents/Guardian		
Administrative staff	72	32.73%
Manager/Supervisor	48	21.82%
OFW	22	10.00%
Skilled Workers	25	11.36%
Professional	45	20.45%
Others	8	3.64%
Total	**220**	**100 %**

Table 1 shows the demographic characteristics of the E-learners. 56.36% of the respondents were grade 10 students while the 43.64% of the respondents were grade 8 students. 36.36% of the students belong to the family with five members, while 1.8% of them belong to the family of two members. Most of the students (180 out of 220 students) are tasked to wash the dishes while 4.55% of them are tasked to do other tasks like taking care of their pets and helping their parents on their business. 28.64% of the respondents have a gross family monthly income of more than P40 000 while 9.09% of them earn gross family monthly income less than P10 000. 32.73% of the respondents' parents or guardians are administrative staff while 3.64% of the respondents' parents or guardians were entrepreneurs, security guards, and bank tellers.

Table 2 shows the E-learning characteristics of the respondents. 57.27% of the respondents used fiber internet connection while 20% used satellite internet connection. 36.82% of the respondents were connected to a speed of 25 megabits per second (mbps) in their internet connection while 9.54% of them were connected to a speed of less than 5 mbps. 50% of the students have reference books available at home while 25% of the respondents have textbooks available at home. 46.36% of the respondents were always present during their synchronous classes while 1.85% of them missed their synchronous classes thrice a week. 65.18% of the students have no available tutor at home while 0.9% hired a tutor. 39.54% of the respondents spent more than 3 hours of individual studies a day while 8.64% of them devoted less than one hour of individual studies. 62.27% of the respondents encountered unstable internet connectivity while 4.55% of the respondents encountered other difficulties like power failure when attending online math classes.

Table 2. E-Learning Characteristics of the Respondents

Type of Internet Connectivity	**Frequency**	**Percentage**
Fiber	126	57.27 %
Cable	39	17.73 %
DSL	22	10.00 %
Dial-up	6	2.73 %
Satellite	22	10.00 %
Data	5	2.27 %
Total	**220**	**100 %**
Speed of Internet Connectivity (mbps)		
Less than 5 mbps	21	9.54 %
5.01 – 10.00	40	18.18 %
10.01 – 15.00	48	21.82 %
15.01 – 20.00	30	13.64 %
More than 20 mbps	81	36.82 %
Total	**200**	**100 %**
Available Learning Materials at Home		
Textbook/s	55	25.00 %
Reference Material/s	110	50.00 %
None	77	35.00 %
Attendance to Synchronous Learning Session		
Always present	102	46.36 %
Skip/miss the session once	71	32.27 %
Skip/miss the session twice	43	19.55 %
Skip/miss the session thrice	4	1.82 %
Total	**220**	**100 %**
Available Learning Mentor/Tutor		
Sibling/s	34	15.45 %
Parent/Guardian	56	25.45 %
Hired Tutor	2	0.90%
None	150	61.18%
Number of Hours Devoted for Individual Study		
Less than 1 hour	19	8.64 %
1.01 – 2.00 hours	72	32.73 %
2.01 – 3.00 hours	42	19.09 %
More than 3 hours	87	39.54 %
	220	**100 %**
Difficulties Encountered in Math Learning		
Unstable internet connectivity	148	62.27 %
Medium of instruction	50	22.73%
Topics are difficult to understand	101	45.91%
Others	10	4.55%

Table 3. Academic Performance of the Respondents in Mathematics for SY 2020 - 21

Grade Level	Quarterly Grades in Mathematics			
	1st Quarter	2nd Quarter	3rd Quarter	Average
Grade 8	88.13	88.15	93.51	89.93
Grade 10	89.70	88.65	92.42	90.26

Table 3 shows the academic performance of the respondents in mathematics for the school year 2020 – 21. Grade 8 respondents garnered an average grade of 89.93% while grade 10 respondents garnered an average grade in mathematics for the 1st, 2nd, and 3rd quarters of the school year 2020 – 21.

Table 4. Correlation of E-learners' Socio-Demographic Characteristics and E-Learning Profile on the Academic Performance of the Respondents

Independent Variables	Dependent Variable	Pearson-r value	Interpretation	p-value	Remarks
Socio-Demographic Characteristics of Respondents	Academic Performance of Respondents	0.0164	Weak Correlation	0.9249	Not Significant
E-learning Profile of Respondents	Academic Performance of Respondents	0.3208	Moderate Correlation	0.0001	Significant

Table 4 shows the correlation of E-learners' socio-demographic characteristics and e'-learning profile on the academic performance of the respondents. There is a moderate correlation between the e-learning profile of the respondents and their academic performances. It is, however, observed that there is a weak correlation between the socio-demographic characteristics of the respondents and their academic performances. Since the p-value (p = 0.0001) is less than the alpha ($\alpha = 0.05$), there is a significant relationship between the e-learning profile of the respondents and their academic performances. On the other hand, since the p- value (p = 0.9240) is less than alpha (a = 0.05), there is no significant relationship between the socio-demographic characteristics of the respondents and their academic performance.

Discussion

Socio-demographic characteristics and e-learning profile of the students were correlated to their academic performances. The results reveal that there is no significant relationship between the socio-demographic characteristics of the students and their academic performances. This only implies that the respondents' socio-demographic characteristics are not associated on their academic performances. In the study conducted by Slaughter (2007), demographic profile of students does not relate to the reading performances of the third-grade students.

On the other hand, there is significant relationship between the e-learning profile of the students' and their academic performances. Students' internet connectivity, available textbooks or reference at home, attendance in the synchronous classes, number of individual studies may be associated to the academic performances of the students. In the study conducted by Rapposelli (2014), attendance and participation variables were obtained through the reporting feature of the Blackboard

Learning Management System (LMS). The totals of these variables were measured against the students' final grade for the course to determine the possible strength of correlation. It was found out that attendance and participation are significantly correlated with the students' final grade for the course. Stewart, et al. (2011) worked on attendance data expressed as a percentage of classes attended. The Course Statistics reporting feature in the Blackboard LMS was used to track online participation in this study. The amount of time students spent in the LMS was used to gauge their level of online engagement. Moreover, Newlin (2000) counted total website hits on the home page to see if students were engaging with the course. He discovered that total website hits on the home page in the first week were positively correlated with student grades, implying that monitoring activity can be a reliable indicator of performance.

Conclusion and Recommendations

This study correlated the socio-demographic characteristics and e-learning profile of the respondents to their academic performances. Overall findings suggest that there is no significant relationship between the socio-demographic characteristics of the students and their academic performances. The number of family members, tasks assigned at home to the students, as well as the gross family income of the respondents have nothing to do with how the students will academically perform. However, there is significant relationship between the e-learning profile of the students and their academic performances. Thus, the internet speed and connectivity, available textbooks, and reference books at home of the respondents, the number of hours spent by the students for individual studies, and their attendance to synchronous classes are associated with their academic performances.

It is recommended that teachers should encourage their students to attend synchronous classes for them to be more engaged in the class participation and not to miss school activities and requirements. The school must provide the students supplementary material or learning modules as their references that would help them understand better the discussion. Students must be given the access on the recorded synchronous classes whenever the students were not able to attend classes due to internet connection problems.

References:

Adam, et al. (2017). *Self-Regulated Learning and Online Learning: A Systematic Review*. Springer International Publishing, doi: 10.1007.

Adamiak, J, et al. (2017). Influencing Mathematics Students' Academic Success Through Online Intervention: A Case Study. *South African Journal of Higher Education.*

Alvarez, D, et al. (2015). Maths: from distance to e-learning. Universidad Internacional de la Rioja, UNIR, y RedCultural-Kutursarea, Spain, doi: 10.9781.

Baugher, D., Varanelli, A., & Weisbord, E. (2003). Student Hits in an Internet-Supported. How can instructors use them and what do they mean? *Decision Sciences Journal of Innovative Education.*

Borba, M, et al. (2016). Blended Learning, E-Learning and Mobile Learning in Mathematics. FIZ Karlshuhe, doi: 10.1007.

Chicharro, F, et al. (2019). *The Enhancement of Academic Performance in Online Environments*. Multidisciplinary Digital Publishing Institute.

Di Xu, (2013). *Adaptability to Online Learning: Differences Across Types of Students and Academic Subject Areas*. Community College Research Center, working paper no. 54.

Drijvers, P, et al. (2014). *The Effect of Online Tasks for Algebra on Student Achievement in Grade 8*. Springer Science+Business Media Dordrecht, doi: 10.1007.

Israel, O. (2015). *Effects of Mathematics Innovation and Technology on Students Performance in Open and Distance Learning*. Ekiti State University, doi:10.17810.

Hegeman, J. (2015). Using Instructor-Generated Video Lectures in Online Mathematics Courses Improves Student Learning. *Missouri Western State University, 19*(3).

Moreno-Guererro, A, et al. (2020). *E-Learning in the Teaching of Mathematics: An Educational Experience in Adult High School*. Multidisciplinary Digital Publishing Institute.

Rapposeli, J.A. (2014). *Correlation between Attendance and Participation with Respect to Student Achievement in an Online Environment.* Liberty University, Lynchburg, VA

Sadera, W. (2011). Comparing Student Success Between Developmental Math Courses Offered Online, Blended, and Face-to-Face. *Journal of Interactive Online Learning, 10*(3).

Slaugher, S. (2007). *Demographic Profiles Associated with Academic Performance for Third Grade Students in North Forest and Aldine Independent School Districts in Texas.* Texas A & University.

Stewart, M. Stott, T. Nuttall, A. (2011). Student Engagement Patterns over the Duration of Level I and Level III Geography Modules: Influences on Student Attendance, Performance, and Use of Online Resources. *Journal in Geography in Higher Education*.

Rapposeli, J.A. (2014). *Correlation between Attendance and Participation with Respect to Student Achievement in an Online Environment.* Liberty University, Lynchburg, VA

Zwart, D, et al. (2017). The Effects of Digital Learning Material on Students' Mathematics Learning in Vocational Education. *Professional Education and Training Research*, doi: 10.1080.